

AMENDMENTS TO THE CLAIMS:

This listing of the claims will replace all prior versions, and listings, of the claims in this application.

Listing of Claims:

1. (Currently Amended) A method for transmitting a packet, said packet having a release time and a tag having a tag value comprising ~~the steps of:~~
in a time-ordered data structure comprising a future portion, adding the tag to a the future portion of a the data structure based on a release time, said data structure having a current-tree near the future portion, said future portion having storage capacity for at least two tags;
removing the tag from an eligible set of tags, including the tag, based on the tag value; and
transmitting the packet that is associated with the removed tag on an output link;
where adding includes inserting the tag as a node into a tree that is selected from a plurality of trees.
2. (Currently Amended) The method of claim 1 wherein ~~the step of~~ removing is preceded by a ~~step of:~~ selecting an the eligible set of tags.
3. (Currently Amended) The method of claim 2 wherein ~~the step of~~ selecting further comprises ~~the step of~~ selecting at least one post-current tag, including the tag.
4. (Currently Amended) The method of claim 2 wherein ~~the step of~~ selecting further comprises ~~the step of~~ selecting a tag having a smallest tag value in a post-current tree.
5. (Currently Amended) The method of claim 1 wherein ~~the step of~~ removing the tag is preceded by ~~the step of:~~ advancing the current-tree, wherein the future portion is based on the current-tree.
6. (Currently Amended) The method of claim 5 wherein ~~the step of~~ advancing further comprises ~~the steps of:~~ destroying a an old tree at a location T steps from the current-tree and wherein the

data structure has at least $2 \cdot T$ trees.

7. (Currently Amended) The method of claim 6 wherein ~~the step of~~ destroying further comprises ~~the step of~~: reallocating at least one tag of the old tree that has a tag value at least as large as a smallest tag value of the old tree.

8. (Currently Amended) ~~The method of claim 6~~ A method for transmitting a packet, said packet having a release time and a tag having a tag value comprising:
in a time-ordered data structure comprising a future portion, adding the tag to the future portion of the data structure based on a release time, said data structure having a current-tree near the future portion, said future portion having storage capacity for at least two tags;
removing the tag from an eligible set of tags, including the tag, based on the tag value; and
transmitting the packet that is associated with the removed tag on an output link;
where removing the tag is preceded by advancing the current-tree, where the future portion is based on the current-tree;
where advancing further comprises destroying an old tree at a location T steps from the current-tree, where the data structure has at least $2 \cdot T$ trees; and
wherein ~~the step of~~ advancing further comprises ~~the steps of~~: adding a tag having a smallest tag value of a tree pointed to by the current-tree to ~~an~~ the eligible set of tags.

9. (Currently Amended) ~~The method of claim 1~~ A method for transmitting a packet, said packet having a release time and a tag having a tag value comprising:
in a time-ordered data structure comprising a future portion, adding the tag to the future portion of the data structure based on a release time, said data structure having a current-tree near the future portion, said future portion having storage capacity for at least two tags;
removing the tag from an eligible set of tags, including the tag, based on the tag value; and
transmitting the packet that is associated with the removed tag on an output link;
wherein ~~the step of~~ adding further comprises ~~the steps of~~: adding the tag to a sub-tree portion of a tree; and converting the sub-tree to an optimized sub-tree.

10. (Currently Amended) The method of claim 1 wherein ~~the step of~~ removing is preceded by ~~the step of~~ advancing a current-tree pointer at least one step through the data structure.

11. (Currently Amended) ~~The method of claim 1~~ A method for transmitting a packet, said packet having a release time and a tag having a tag value comprising:
in a time-ordered data structure comprising a future portion, adding the tag to the future portion of the data structure based on a release time, said data structure having a current-tree near the future portion, said future portion having storage capacity for at least two tags;
removing the tag from an eligible set of tags, including the tag, based on the tag value; and
transmitting the packet that is associated with the removed tag on an output link;
wherein ~~the step of~~ removing is preceded by ~~the steps of~~: determining if the tag is a smallest tag in a post-current tree; and adding the tag to a min-tree provided the tag is the smallest tag.

12. (Currently Amended) A method in a router for scheduling a packet having a selected tag, said tag having a tag value, said packet having a release time, comprising ~~the steps of~~:
selecting a selected tree from at least two trees based on the release time, wherein a first tree has a first time period ; and a second tree has a second time period later than the first time period;
storing the selected tag in an order in the selected tree by adding a node to the selected tree;
selecting an eligible set of tags including at least the selected tag; and
removing the selected tag from the eligible set of tags, wherein the eligible set of tags has no smaller tag value.

13. (Currently Amended) The method of claim 12 wherein ~~the step of~~ selecting an eligible set of tags further comprises ~~the step of~~: adding the selected tag to a current tree.

14. (Currently Amended) The method of claim 13 wherein ~~the step of~~ selecting an eligible set of tags further comprises ~~the steps of~~: advancing the current tree to a tree having at least one tag.

15. (Currently Amended) The method of claim 14 wherein ~~the step of~~ advancing further comprises ~~the step of~~ removing at least one tag from an old tree.

16. (Currently Amended) The method of claim 12 wherein ~~the step of~~ removing a tag further comprises ~~the step of~~ transmitting a packet associated with the selected tag.

17. (Currently Amended) The method of claim 12 wherein ~~the step of~~ selecting a tree is preceded by ~~the step of~~ determining that the release time is smaller than a discard time.

18. (Currently Amended) ~~The method of claim 12~~ A method in a router for scheduling a packet having a selected tag, said tag having a tag value, said packet having a release time, comprising: selecting a selected tree from at least two trees based on the release time, wherein a first tree has a first time period ; and a second tree has a second time period later than the first time period; storing the selected tag in an order in the selected tree; selecting an eligible set of tags including at least the selected tag; and removing the selected tag from the eligible set of tags, wherein the eligible set of tags has no smaller tag value;

wherein ~~the step of~~ storing further comprises ~~the steps of~~: determining if the selected tag is larger than a node in the tree; placing the selected tag in a left sub-tree provided it is determined that the selected tag is not larger than the node; and placing the selected tag in a right sub-tree provided it is determined that the selected tag is larger than the node.

19. (Currently Amended) An apparatus for transmitting a packet, said packet having a release time and a tag having a tag value, comprising:

a means for adding the tag to a future portion of a time-ordered data structure based on a release time, said data structure having a current-tree near the future portion, said future portion having storage capacity for at least two tags;

a means for removing the tag from an eligible set of tags, including the tag, based on the tag; and

a means for transmitting the packet associated with the removed tag on an output link;

where said means for adding inserts the tag as a node into a tree that is selected from a plurality of trees.

20. (Currently Amended) The apparatus of claim 19 wherein the apparatus further comprises a means for selecting ~~an~~ the eligible set of tags.

21. (Currently Amended) The apparatus of claim 20 wherein the means for selecting further comprises a means for selecting at least one post-current tag, including the tag.

22. (Currently Amended) The apparatus of claim 20 wherein the means of selecting further comprises a means for selecting a tag having a smallest tag value in a post-current tree.

23. (Currently Amended) The apparatus of claim 19 wherein the apparatus further comprises a means for advancing the current tree, wherein the future portion is based on the current tree.

24. (Currently Amended) The apparatus of claim 23 wherein the means for advancing further comprises a means for destroying a an old tree at a location T steps from the current-tree, and wherein the data structure has at least 2^T trees.

25. (Currently Amended) The apparatus of claim 24 wherein the means for destroying comprises a means for reallocating at least one tag of the old tree that has a tag value at least as large as a smallest-tag value of the old tree.

26. (Currently Amended) ~~The apparatus of claim 24~~ An apparatus for transmitting a packet, said packet having a release time and a tag having a tag value, comprising:
means for adding the tag to a future portion of a time-ordered data structure based on a release time, said data structure having a current-tree near the future portion, said future portion having storage capacity for at least two tags;
means for removing the tag from an eligible set of tags, including the tag, based on the tag; and
means for transmitting the packet associated with the removed tag on an output link;
where the apparatus further comprises means for advancing the current tree, where the future portion is based on the current tree;
where the means for advancing further comprises means for destroying an old tree at a location

T steps from the current-tree, where the data structure has at least $2 \times T$ trees; and
wherein the means for advancing further comprises a means for adding a tag having a smallest tag value of a tree pointed to by the current-tree to an eligible set of tags.

27. (Currently Amended) ~~The apparatus of claim 18~~ An apparatus for transmitting a packet, said packet having a release time and a tag having a tag value, comprising:
means for adding the tag to a future portion of a time-ordered data structure based on a release time, said data structure having a current-tree near the future portion, said future portion having storage capacity for at least two tags;
means for removing the tag from an eligible set of tags, including the tag, based on the tag; and
means for transmitting the packet associated with the removed tag on an output link;
wherein the means for adding further comprises:
a means for adding the tag to a sub-tree portion of a tree; and
a means for converting the sub-tree to an optimized sub-tree.

30 28. (Currently Amended) The apparatus of claim 19 wherein the apparatus further comprises
a means for advancing a current-tree pointer at least one step through the data structure.

31 29. (Currently Amended) ~~The apparatus of claim 19~~ An apparatus for transmitting a packet, said packet having a release time and a tag having a tag value, comprising:
means for adding the tag to a future portion of a time-ordered data structure based on a release time, said data structure having a current-tree near the future portion, said future portion having storage capacity for at least two tags;
means for removing the tag from an eligible set of tags, including the tag, based on the tag; and
means for transmitting the packet associated with the removed tag on an output link;
wherein the apparatus further comprises:
a means for determining if the tag is a smallest tag in a post-current tree; and
a means for adding the tag to a min-tree provided the tag is the smallest tag.